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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/581,468	06/12/2000	MASASHIGE SATO	1111.64360	9963

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EXAMINER

BLOUIN, MARK S

ART UNIT

PAPER NUMBER

2653

DATE MAILED: 07/01/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/581,468

Applicant(s)

SATO ET AL.

Examiner

Mark Blouin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 April 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 11-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 11.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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Detailed Action

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 30 April 03 has been entered.

Response to Amendment

- Amended Claims 1 and 7 are acknowledged.

Claim Rejections – 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1-6, 7-9, 14, and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Noguchi et al. (USPN 5,862,022).

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3. Regarding Claims 1 and 2, Noguchi et al. shows (Fig. 46) a magnetic sensor including a ferromagnetic tunnel junction (21) comprising a free layer (211) a magnetic direction of which freely rotates, a barrier layer formed (210+213) on the free layer and having a smaller thickness in a first region (D1), a region of the free layer corresponding to the first region functioning as a sensor portion for sensing an external magnetic field, wherein the barrier layer is formed by oxidizing the surface of a metal (Col. 10, lines 17-20), and the first region (D1) being a region except the edge part of the barrier layer (210+213).

4. Regarding Claim 3, Noguchi et al. shows (Fig. 46) a magnetic sensor comprising a fixed layer (212) formed on the barrier layer (210+213), an anti-ferromagnetic layer (216) formed on the fixed layer (212) and fixing a magnetic direction of the fixed layer.

5. Regarding Claim 4, Noguchi et al. shows (Fig. 42) a magnetic sensor wherein the free layer in a region where the fixed layer is not formed is bent away from the fixed layer. The free layer (211) is formed in and occupies its own region below the fixed layer (212) and bends away from the fixed layer at a point in the vicinity above the end of the electrode (22).

6. Regarding Claims 5 and 6, Noguchi et al. shows a magnetic head and magnetic encoder comprising the magnetic sensor (Fig. 23). A magnetic head serves to encode data on recording media and thereby functions as a magnetic encoder.

7. Regarding Claims 7-9, 14 and 17, Noguchi et al. shows (Fig. 46) a hard disk device comprising a magnetic head comprising a ferromagnetic tunnel junction element including a free layer (211) a magnetic direction of which freely rotates, and a fixed layer (212) which is opposed to one surface of the free layer through a barrier layer (210+213) and a magnetic direction of which is fixed by an anti-ferromagnetic layer (216) which is adjacent thereto, an end portion of

the free layer being extended from and projected from the ferromagnetic tunnel junction element, and the end portion of the free layer being connected smoothly to a grounded member of high permeability (22) being a shield layer spaced from the ferromagnetic tunnel junction element, neighboring the same, in a region spaced from a signal detection surface (See Examiner's Drawing).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 7,8,11,12, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi et al. in view of Gill.

10. Regarding Claims 7,8,11,12, and 15, Noguchi et al. shows a magnetic tunnel junction wherein the thickness of the barrier layer near the edge of the fixed layer is larger than a thickness of the barrier layer near a central part of the fixed layer, the free layer is formed wider in a region spaced from the signal detection surface, and the free layer in a region which is not opposed to the fixed layer is bent away from the fixed layer. Noguchi et al. does not show an end portion of the free layer connected to a member of high permeability being a shield layer spaced from the ferromagnetic tunnel junction element in a region space from a signal detection surface. Gill shows (Fig.9) an end portion of the free layer connected to a member of high permeability being a shield layer spaced from the ferromagnetic tunnel junction element in a region space from a signal detection surface. It would have been obvious to one with ordinary

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skill in the art at the time the invention was made to combine the magnetic tunnel junction of Noguchi et al. with the magnetic head of Gill. The rationale is as follows: One of ordinary skill in the art at the time of invention would have been motivated to combine the magnetic tunnel junction of Noguchi et al. with the magnetic head of Gill in which a high magneto-resistive ratio can be achieved with good reproduction characteristics.

11. Claims 13, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gill in view of Fujishima et al. (JPN 07073419A).

12. Regarding Claim 13, Gill shows the features of the magnetic head described above, however, does not show the fixed layer is not exposed to the signal detection surface. Fujishima shows (Fig. 1) the fixed layer is not exposed to the signal detection surface. It would have been obvious to one with ordinary skill in the art at the time the invention was made to move the head of Gill away from the signal detection surface as taught by Fujishima. The rationale is as follows: One of ordinary skill in the art at the time of invention would have been motivated to move the head of Gill away from the signal detection surface as taught by Fujishima in order to prevent damage, corrosion, and static electricity from discharging between members.

13. Regarding Claim 16, Gill shows the features of the magnetic head described above, however, does not show a ferromagnetic tunnel junction element further including another fixed layer which is opposed to the free layer, a magnetic direction of another fixed layer being fixed by another anti-ferromagnetic layer which is adjacent thereto. Official Notice is taken that dual ferromagnetic tunnel junction elements are old and well known in the art, therefore, it would have been obvious to one of ordinary skill in the art to combine the aforementioned features with the magnetic head of Gill. The rationale is as follows: One of ordinary skill in the art at the time

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of invention would have been motivated to combine the dual ferromagnetic tunnel junction element with the magnetic head of Gill in order to provide more signal as there is spin dependent scattering on both sides of the free layer.

14. Regarding Claim 18, Gill shows the features of the magnetic head described above, however, does not show a disk array device comprising a plurality of hard disk devices. Official Notice is taken that disk array devices comprising a plurality of hard disk devices are old and well known in the art, therefore, it would have been obvious to one of ordinary skill in the art to combine the aforementioned features with the magnetic head of Gill. The rationale is as follows: One of ordinary skill in the art at the time of invention would have been motivated to combine the disk array device comprising a plurality of hard disk devices with the magnetic head of Gill in order to increase storage capacity.

Response to Arguments

15. Applicant's arguments filed on November 21, 2002 have been fully considered but they are not persuasive.

Applicant asserts on Page 7:

“... the first region is a region except the edge part of the barrier layer” is not disclosed.

The Examiner maintains that whether or not the edge part is part of the first region, the first region can be clearly and technically defined with exception to the edge part of the ferromagnetic tunnel junction of the magnetic head. Therefore, the rejection of Claim 1 and associated dependent claims are upheld.

Applicant asserts on Page 9 :

“... an end portion of a free layer being extended from or projected from a ferromagnetic tunnel junction element, and connected to a shield layer of high permeability spaced from the ferromagnetic tunnel junction element ...” is not disclosed.

The Examiner maintains that Noguchi et al (USPN 5,862,022) shows a ferromagnetic tunnel junction element including a free layer (211) a magnetic direction of which freely rotates, the free layer being connected smoothly to a grounded member of high permeability (22), in a region spaced from a ferromagnetic tunnel junction element. The end portion (See Examiner's Drawing) of the free layer (211) extends away from or projects from the recording medium while connected to the member of high permeability being spaced from the ferromagnetic tunnel junction element.

Therefore, the rejection of Claim 7 and associated dependent claims are upheld.

Conclusion

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Blouin whose telephone number is (703) 305-5629. The examiner can normally be reached M-F, 6:00 am – 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful the examiner's supervisor, William Korzuch can be reached at (703) 305-6137. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9314 for regular and After Final communications.

Any inquiry of general nature or relating to the status of application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.

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Mark Blouin
Patent Examiner

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June 30, 2003




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